★PLAN → Give Blank Formula sheet, Label Formula # (just for easier reference)
→ go through each question, & ask which formula (underline keywords)
→ once answered, write notes about the corresponding formula

Using the Finance Formulas

Show your work. Clearly show which formulas you are using and what values you are substituting into each part of the formula. Only round answers once at the end of the calculation.

1. Assume a 6-month CD purchased for $5,000 pays simple interest at an annual rate of 9.5%. How much interest does it earn? (1)

2. At age 25, you start work for a company that deposits $10,000 into a retirement account that pays an annual interest rate of 13.2% compounded monthly. If you retire at 65, what is the balance in this account? (3)

★ 3. Find the interest paid on a 30-year loan of $350,000 at an annual interest rate of 6% compounded monthly. Assume that you made monthly payments for the full 30 years. (9)

4. Suppose a CD advertised an interest rate of 8% compounded monthly. What is the effective annual yield? Express your answer to the nearest tenth of a percent. (6)

★ 5. You are interested in a car which costs $25,000. You have a $2000 down payment, and you have a found a 4-year loan at 4.5% annual interest compounded monthly. How much total interest do you end up paying if you make equal monthly payments over the entire four years? (9)

6. You want to save money to buy a new computer. If you deposit $100 a month at an annual interest rate of 6% compounded monthly, how much money will you have saved after a year? (7)

7. You deposit $2000 at 3.25% annual interest compounded continuously. How much do you have after 2 years? (5)

8. What is the effective annual yield for a savings account with an annual interest rate of 2.3% compounded semi-annually? (6)

3% APR quarterly → How much invest today to have $2000 in 5 years?

9. Suppose you want to borrow $450,000 for a term of 25 years at an annual interest rate of 5.5% compounded monthly. What would your monthly payment be? (4)

10. How much should you deposit at the end of each quarter into an account that pays 4.4% annual interest compounded quarterly in order to have $5000 in three years? (8)

11. Against expert advice, you begin your retirement savings at age 40. You plan on retiring at age 65. How much will you need to deposit each month into a savings account with an annual interest rate of 6% compounded monthly if your goal is to save $150,000? (8)

12. The going annual interest rate for a loan with a term of 30 years is 6% compounded monthly. The lending agency says that based on your income, your monthly payment can be at most $900. How much can you borrow?

credit card balance of $8,500 @ 17.99% APR. Pay $500 each month. How many months to pay off? (10)

Using Finance formulas → KEY

1) $I = Prt = 5000(0.045)(\frac{1}{2})$ $\$112.50$

2) $A = P(1+\frac{r}{n})^{nt} = 10000(1+\frac{0.133}{12})^{12(65-25)} = \$1,907,895.94$

in Hawkes $= \frac{P(\frac{r}{n})}{\text{<...>}}$ (slightly different)

3) $PMT = \frac{P(\frac{r}{n})}{[1-(1+\frac{r}{n})^{-nt}]} = \frac{350,000(\frac{0.06}{12})}{[1-(1+\frac{0.06}{12})^{-12(30)}]} = \$2,098.43$

Total paid = PMT * # of payments = 2098.43 * (12 × 30) = $\$755,434.80$

Interest = Total paid − Loan Amount = $755,434.80 - 350,000 =$ $\$405,434.80$

4) $APY = [(1+\frac{r}{n})^{n}-1]100 = [(1+\frac{0.08}{12})^{12}-1]100 = 8.3\%$

5) P = Price − down payment = $25,000 - 2,000 = \$23,000$

$PMT = \frac{P(\frac{r}{n})}{[1-(1+\frac{r}{n})^{-nt}]} = \frac{23000(\frac{0.045}{12})}{[1-(1+\frac{0.045}{12})^{-12(4)}]} = \$524.48$

Total cost = PMT * # of payments + down payment

↓ $= 524.48\ (12\times4) + 2000 = \$27,175.04$

Interest = Total cost − Price $= 27,175.04 - 23,000 = \$2175.04$

OR ↓ = PMT * # of payments − P $= 524.48(12\times4) - 23,000 = \$2,175.04$

6) $FV = PMT\frac{[(1+\frac{r}{n})^{nt}-1]}{(\frac{r}{n})} = 100\frac{[(1+\frac{0.06}{12})^{12(4)}-1]}{(\frac{0.06}{12})} = \$1,233.56$

7) $A = Pe^{rt} = 2000e^{0.0325(2)} = \$2,134.32$

8) $APY = [(1+\frac{r}{n})^{n}-1]100 = [(1+\frac{0.033}{2})^{2}-1]100 = 2.31\%$

9) $P = \frac{A}{(1+\frac{r}{n})^{nt}} = \frac{2000}{(1+\frac{0.03}{4})^{4(5)}} = \$1722.38$

10) $PMT = FV \dfrac{\left(\frac{r}{n}\right)}{\left[\left(1+\frac{r}{n}\right)^{nt}-1\right]} = 5000 \dfrac{\left(\frac{0.044}{4}\right)}{\left[\left(1+\frac{0.044}{4}\right)^{4(2)}-1\right]} = \$593.06$

11) $PMT = FV \dfrac{\left(\frac{r}{n}\right)}{\left[\left(1+\frac{r}{n}\right)^{nt}-1\right]} = 150{,}000 \dfrac{\left(\frac{0.06}{12}\right)}{\left[\left(1+\frac{0.06}{12}\right)^{12(65-40)}-1\right]} = \$216.46$

12) $n = \dfrac{-\log\left[1-\frac{r}{n}\left(\frac{A}{PMT}\right)\right]}{\log\left(1+\frac{r}{n}\right)} = \dfrac{-\log\left[1-\frac{0.1799}{12}\left(\frac{8500}{500}\right)\right]}{\log\left(1+\frac{0.1799}{12}\right)}$

n ↓ 8 months

$\approx 19.77 \rightarrow 20$ months